

# Technical Workshop on Estuarine Habitat in the Bay Delta Estuary

## *Managing the Low Salinity Zone to Improve Estuarine Habitat and Protect Fish Populations*

Summary Notes of Team Discussions of the question:

What are the key points of scientific agreement, disagreement, and uncertainty surrounding estuarine habitat and pelagic fishes in the Bay Delta Estuary? How could scientists and agencies “manage the uncertainty” while advancing the protection of water quality and estuarine habitat?

As recorded and reported by Les Grober<sup>1</sup>

Following, in no particular order, are various summary statements of scientific agreements, with various disagreements and uncertainties called out:

The Low Salinity Zone (LSZ) is not equivalent to estuarine habitat; estuarine habitat is 0 to 35 ppt salinity; LSZ is just one part

LSZ is important measure of estuarine habitat for certain species

- LSZ and flow more important to pelagic species, with more certainty; less so for salmon and sturgeon; for salmon, ocean harvest, hatchery, predation, tribes more important

Many things are important to estuarine habitat and many things have changed regarding estuarine habitat since 1970s

You can tell a lot about estuary if you know where high salinity meets low salinity

Habitat means:

- Salinity
- Temperature
- Turbidity
- Food supply
- Predation
- Spawning area
- Geometry- depth, area volume of water; flow is basic element of estuarine habitat
- Gradients
- Variability at all times and spatial scales- longitudinal and horizontal
- Connectivity
- Zone of maximum turbidity

Limiting any essential element of habitat will limit the quality of the habitat

These notes summarize the discussions in Groups 1, 2, and 3 at USEPA's 27 March 2012 Technical Workshop on Estuarine Habitat in the Bay Delta Estuary. The reporter apologizes for any omissions and mischaracterizations of the thoughtful discussions. Any views expressed in these notes are those of the individuals in the Groups as heard and recorded by the reporter, and do not necessarily reflect the views of the State Water Board, its individual members, or the State of California.

Estuary/ LSZ is very productive relative to other aquatic systems

We know the importance of salinity for aquatic life; some species benefit from more saline conditions (higher than 2ppt) but these are generally species we don't care about

For existing condition:

- Connectivity increases with seaward X2
- Connectivity decreases when LSZ is more upstream
- Connectivity with open water with poor habitat is not good

More certainty regarding longitudinal salinity gradient; less regarding horizontal gradient

LSZ is middle of range of habitats

LSZ is getting less turbid; Suisun bay is getting shallower (losing sediment)

Variability in LSZ is essential for resident fish; not so much for salmon and sturgeon

There are large scale status and trends of declines in abundance of species, especially for pelagic, but there is not good info on causation; less agreement regarding mechanisms; role of LSZ in abundance is uncertain

We have focused much effort on physical side of estuary (geometry and hydrology), not so much on the ecological (processes); more needs to be done regarding understanding ecological processes; agree that this work needs to be done; disagree on what the answer will be.

Productivity is decreasing; disagree on how; if related to grazing vs ammonium; uncertainty about extent of the importance of ammonium to primary production

If productivity in LSZ goes up it is not clear how much would go to fish and how much to clams; big uncertainty on whether increase in productivity would go to benthic or pelagic

If we do increase productivity, it would be better to do so in Spring

Larger risk of entrainment when LSZ is upstream; disagree on importance of this to populations

Habitat against shore is important; uncertain what is going on at edges; should address this uncertainty through measurement

Physical attributes of LSZ depends on where it is; uncertainty regarding effects can be addressed through measurement

Some physical properties of LSZ have changed; e.g. chlorophyll has gone down

Providing quantity of habitat is easier than quality of habitat; there is more disagreement and certainty on what constitutes quality habitat

Greater diversity in landscape provides more temporal and spatial variability in habitat

Connectivity is important to make connections between diverse habitats

Having variability creates resiliency

Discussion of Master Variable—fundamental disagreement:

- Some think flow is master variable; others think changes in nutrients
- What essential attribute has changed?
- Some think idea of any master variable or essential attribute is flawed; declines in abundance are related to multiple factors
- Hard to find any indicator that is not affected by flow and landscape

What to do regarding uncertainty? Depends on nature of uncertainty; if

- If uncertain regarding fundamentals such as what is the major stressor, e.g. flow versus changes in nutrients, then no clear path
- If uncertain regarding details; then measure and adapt

Uncertainty, based on statistics, has been used as an excuse for no action

Uncertain as to the appropriate scale for heterogeneity, but it should be scaled to the available tidal energy

Other thoughts from individuals, with little or no discussion or concurrence, or lack of concurrence (emerged from only one group):

We know things about fish and zooplankton; we don't know microbes; microbes are important to eco processes

We don't know as much about wetlands (seasonal and permanent) and species that use them, as we do about open water.

There has been a shifting baseline, a changing view of what is a good population

We should design landscapes to accommodate connectivity, scale, and the location of favorable habitat features